

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Mirror-assisted backscattering interferometry to measure the first-order correlation function of the light emitted by quantum scatterers (<i>10 pages</i>)	053716
P. G. S. Dias, M. Frometa, P. H. N. Magnani, K. R. B. Theophilo, M. Hugbart, Ph. W. Courteille, and R. Celistrino Teixeira	
Maximizing precision in saturation-limited absorption measurements (<i>11 pages</i>)	053717
Jake Biele, Sabine Wollmann, Joshua W. Silverstone, Jonathan C. F. Matthews, and Euan J. Allen	
n -photon blockade with an n -photon parametric drive (<i>9 pages</i>)	053718
Yan Hui Zhou, Fabrizio Minganti, Wei Qin, Qi-Cheng Wu, Jun-Long Zhao, Yu-Liang Fang, Franco Nori, and Chui-Ping Yang	
Controlling quantum correlations in optical-angle–orbital-angular-momentum variables (<i>7 pages</i>)	053719
Yue Zeng, Dongkai Zhang, Fangqing Tang, Shaochen Fang, Wuhong Zhang, and Lixiang Chen	
Squeezed-vacuum-induced optical tristability in an atom-cavity system (<i>5 pages</i>)	053720
Jiahui Ning, Cunjin Liu, Min Xie, Shengguo Guan, Yanbei Cheng, and Bixuan Fan	
Generation of spin cat states in an engineered Dicke model (<i>12 pages</i>)	053721
Caspar Groiseau, Stuart J. Masson, and Scott Parkins	
Stabilization of product states and excited-state quantum phase transitions in a coupled qubit-field system (<i>14 pages</i>)	053722
Pavel Stránský, Pavel Cejnar, and Radim Filip	

ERRATA

Erratum: Overcoming the uplink limit of satellite-based quantum communication with deterministic quantum teleportation [Phys. Rev. A 104 , 022615 (2021)] (<i>1 page</i>)	059901(E)
Zhiyue Zuo, Yijun Wang, Qin Liao, and Ying Guo	
Erratum: Focused fields of ultrashort radially polarized laser pulses having low-order spatiotemporal couplings [Phys. Rev. A 103 , 033512 (2021)] (<i>2 pages</i>)	059902(E)
Spencer W. Jolly	
Erratum: Physical origin of the universal three-body parameter in atomic Efimov physics [Phys. Rev. A 90 , 022106 (2014)] (<i>1 page</i>)	059903(E)
Pascal Naidon, Shimpei Endo, and Masahito Ueda	
Erratum: Efficient entanglement criteria for discrete, continuous, and hybrid variables [Phys. Rev. A 94 , 020101(R) (2016)] (<i>1 page</i>)	059904(E)
Manuel Gessner, Luca Pezzè, and Augusto Smerzi	

Depolarization of the supercontinuum induced by linearly and circularly polarized femtosecond laser pulses in water (7 pages)	053535
Jing Li, Wenjiang Tan, Jinhai Si, Shiyun Tang, Yang Yang, and Xun Hou	
Quantum optics	
Distant emitters in ultrastrong waveguide QED: Ground-state properties and non-Markovian dynamics (14 pages)	053701
Carlos A. González-Gutiérrez, Juan Román-Roche, and David Zueco	
Photon-emitter dressed states in a closed waveguide (12 pages)	053702
Davide Lonigro, Paolo Facchi, Andrew D. Greentree, Saverio Pascazio, Francesco V. Pepe, and Domenico Pomarico	
Waveguide-QED platform for synthetic quantum matter (21 pages)	053703
Ying Dong, J. Taylor, Youn Seok Lee, H. R. Kong, and K. S. Choi	
Noise limits on two-photon interferometric sensing (17 pages)	053704
Hamish Scott, Dominic Branford, Niclas Westerberg, Jonathan Leach, and Erik M. Gauger	
Collective emission of an atomic beam into an off-resonant cavity mode (14 pages)	053705
Simon B. Jäger, Haonan Liu, John Cooper, and Murray J. Holland	
Technique for active stabilization of the relative phase between seed and pump in an optical parametric oscillator (9 pages)	053706
Simone Cialdi, Edoardo Suerra, Matteo G. A. Paris, and Stefano Olivares	
Optimizing single-photon generation and storage with machine learning (10 pages)	053707
Miao Cai, Yanqing Lu (陆延青), Min Xiao, and Keyu Xia (夏可宇)	
Quantum phase transition of light in the dissipative Rabi-Hubbard lattice: A dressed-master-equation perspective (6 pages)	053708
Tian Ye, Chen Wang, and Qing-Hu Chen	
Photon statistics of the light transmitted and reflected by a two-dimensional atomic array (11 pages)	053709
Daniel Cano	
Photon antibunching as a probe of trajectory information of individual neutral atoms traversing an optical cavity (15 pages)	053710
Zhiming Wu, Shuting Shen, Jiahua Li, and Ying Wu	
Transmission spectra of the driven, dissipative Rabi model in the ultrastrong-coupling regime (16 pages)	053711
L. Magazzù, P. Forn-Díaz, and M. Grifoni	
Quantum metrology with superposition spin coherent states: Insights from Fisher information (6 pages)	053712
Yusef Maleki, Marlan O. Scully, and Aleksei M. Zheltikov	
Spin-orbit grating of light in coherent media (12 pages)	053713
Lu Zhao	
 Weak localization of light in hot atomic vapors (10 pages)	053714
N. Cherroret, M. Hemmerling, G. Labeyrie, D. Delande, J. T. M. Walraven, and R. Kaiser	
Quantum simulation of a three-mode optomechanical system based on the Fredkin-type interaction (12 pages)	053715
Jin Liu, Yue-Hui Zhou, Jian Huang, Jin-Feng Huang, and Jie-Qiao Liao	

(Continued)

Lateral optical force along the translationally invariant direction of optical fields formed by circularly polarized plane waves (7 pages)	053520
Ziheng Xiu, Yusen Zhang, Hongsheng Shi, Hongxia Zheng, Huajin Chen, Wanli Lu, and Zhifang Lin	
Spaceless description of active optical media (7 pages)	053521
Giovanni Giacomelli, Serhiy Yanchuk, and Antonio Politi	
Qubit-photon bound states in topological waveguides with long-range hoppings (17 pages)	053522
C. Vega, M. Bello, D. Porras, and A. González-Tudela	
Position measurement of a dipolar scatterer via self-homodyne detection (10 pages)	053523
G. Cerchiari, L. Dania, D. S. Bykov, R. Blatt, and T. E. Northup	
Anapole due to a tangentially polarized dipole near a subwavelength sphere: Inhibition and enhancement of spontaneous emission (8 pages)	053524
Jorge R. Zurita-Sánchez	
Recognition of orbital-angular-momentum modes with different topological charges and their unknown superpositions via machine learning (8 pages)	053525
Ling-Feng Zhang, Ya-Yi Lin, Zhen-Yue She, Zhi-Hao Huang, Jia-Zhen Li, Xiaojia Luo, Hui Yan, Wei Huang, Dan-Wei Zhang, and Shi-Liang Zhu	
Complete characterization of attosecond photoelectron wave packets (9 pages)	053526
D. M. Villeneuve, Peng Peng, and Hiromichi Niikura	
Perfectly absorbed and emitted currents by complex potentials in nonlinear media (9 pages)	053527
Dmitry A. Zezyulin and Vladimir V. Konotop	
Cylindrical paraxial optical beams described by the incomplete gamma function (8 pages)	053528
Tomasz Radożycki	
Nonreciprocal pulse shaping and chaotic modulation with asymmetric noninstantaneous nonlinear resonators (8 pages)	053529
A. Hofstrand, M. Cotrufo, and A. Alù	
Coexistence of dark vector soliton Kerr combs in normal dispersion resonators (8 pages)	053530
B. Kostet, Y. Soupart, K. Panajotov, and M. Tlidi	
Topological photonic Su-Schrieffer-Heeger-type coupler (7 pages)	053531
Nikolaos K. Efremidis	
Transfer-matrix method of circular polarization light in an axionic photonic insulator (9 pages)	053532
Anny C. Araújo, Sérgio Azevedo, Cláudio Furtado, André J. Chaves, Carlos H. Costa, and Claudionor G. Bezerra	
Relativistic flying laser focus by a laser-produced parabolic plasma mirror (16 pages)	053533
Tae Moon Jeong, Sergei V. Bulanov, Petr Valenta, Georg Korn, Timur Zh. Esirkepov, James K. Koga, Alexander S. Pirozhkov, Masaki Kando, and Stepan S. Bulanov	
Dynamical determination of the strength of cross-polarization coupling in a whispering-gallery microresonator (8 pages)	053534
Limu Ke, Sreekul Raj Rajagopal, and A. T. Rosenberger	

(Continued)

Directional dark-field implicit x-ray speckle tracking using an anisotropic-diffusion Fokker-Planck equation (13 pages)	053505
Konstantin M. Pavlov, David M. Paganin, Kaye S. Morgan, Heyang (Thomas) Li, Sebastien Berujon, Laurene Quénot, and Emmanuel Brun	
Strong mechanical squeezing and optomechanical entanglement in a dissipative double-cavity system via pump modulation (9 pages)	053506
Wen-Jie Zhang, Yuchi Zhang, Qi Guo, A-Peng Liu, Gang Li, and Tiancai Zhang	
Exceptional points in a dielectric spheroid (7 pages)	053507
Evgeny Bulgakov, Konstantin Pichugin, and Almas Sadreev	
Bulk plasmaritons: Wave-mechanical and second-quantized theories (19 pages)	053508
Jesper Jung and Ole Keller	
Phonon-number resolution of voltage-biased mechanical oscillators with weakly anharmonic superconducting circuits (17 pages)	053509
Mario F. Gely and Gary A. Steele	
Solitons near avoided mode crossings in $\chi^{(2)}$ nanowaveguides (9 pages)	053510
William R. Rowe, Andrey V. Gorbach, and Dmitry V. Skryabin	
Electric-field-profile measurement along a probing laser path based on electric-field-induced second-harmonic generation (6 pages)	053511
Shin Nakamura, Masahiro Sato, Takashi Fujii, Akiko Kumada, and Yuji Oishi	
Control and measurement of electric dipole moments in levitated optomechanics (6 pages)	053512
Gadi Afek, Fernando Monteiro, Benjamin Siegel, Jiaxiang Wang, Sarah Dickson, Juan Recoaro, Molly Watts, and David C. Moore	
Enhanced optical spatial differential operations via strong spin-orbit interactions in an anisotropic epsilon-near-zero slab (7 pages)	053513
Wenhao Xu, Xiaohui Ling, Dingyu Xu, Shizhen Chen, Shuangchun Wen, and Hailu Luo	
Three-dimensional spatiotemporal nondiffracting parabolic cylinder beams (6 pages)	053514
WenYe Zhong, Wei-Ping Zhong, Milivoj Belic, Zhengping Yang, and Guofa Cai	
Dynamical bipartite and tripartite entanglement of mechanical oscillators in an optomechanical array (10 pages)	053515
X. Z. Hao, X. Y. Zhang, Y. H. Zhou, Wenlin Li, S. C. Hou, and X. X. Yi	
Linearized theory of the fluctuation dynamics in two-dimensional topological lasers (12 pages)	053516
Aurelian Loirette-Pelous, Ivan Amelio, Matteo Seclì, and Iacopo Carusotto	
Single-photon-triggered spin squeezing with decoherence reduction in optomechanics via phase matching (10 pages)	053517
Zhucheng Zhang, Lei Shao, Wangjun Lu, Yuguo Su, Yi-Ping Wang, Jing Liu, and Xiaoguang Wang	
Optomechanical dynamics in the $\mathcal{PT}$ - and broken- $\mathcal{PT}$ -symmetric regimes (13 pages)	053518
Hai Xu, Deng-Gao Lai, Yi-Bing Qian, Bang-Pin Hou, Adam Miranowicz, and Franco Nori	
Experimental observation of polarization-resolved nonlinear Thomson scattering of elliptically polarized light (8 pages)	053519
Colton Fruhling, Junzhi Wang, Donald Umstadter, Christoph Schulzke, Mahonri Romero, Michael Ware, and Justin Peatross	

(Continued)

Few strongly interacting fermions of different mass driven in the vicinity of a critical point (<i>10 pages</i>)	053317
Damian Włodzyński and Tomasz Sowiński	
Time-domain Landau-Zener-Stückelberg-Majorana interference in an optical lattice clock (<i>11 pages</i>)	053318
Wei-Xin Liu (刘伟新), Tao Wang (汪涛), Xue-Feng Zhang (张学锋), and Wei-Dong Li (李卫东)	
Rotation-driven transition into coexistent Josephson modes in an atomtronic dc superconducting quantum interference device (<i>10 pages</i>)	053319
D. M. Jezek and H. M. Cataldo	
Effects of a rotating periodic lattice on coherent quantum states in a ring topology: The case of positive nonlinearity (<i>13 pages</i>)	053320
Hongyi Huang and Kunal K. Das	
Analytic expressions for Hubbard models with arbitrary structures in programmable optical lattices (<i>15 pages</i>)	053321
J. P. Hague, L. Petit, and C. MacCormick	
Vortex lattice in spin-imbalanced unitary Fermi gas (<i>10 pages</i>)	053322
Jakub Kopyciński, Wojciech R. Pudelko, and Gabriel Wlazłowski	
Quantum phases of interacting bosons on biased two-leg ladders with magnetic flux (<i>9 pages</i>)	053323
Xin Qiao, Xiao-Bo Zhang, Yue Jian, Ai-Xia Zhang, Zi-Fa Yu, and Ju-Kui Xue	
Faraday-imaging-induced squeezing of a double-well Bose-Einstein condensate (<i>14 pages</i>)	053324
Ebubechukwu O. Ilo-Okeke, Shinichi Sunami, Christopher J. Foot, and Tim Byrnes	
Spin-orbit coupling controlling the topological vortical phase transition in spin-2 rotating Bose-Einstein condensates (<i>8 pages</i>)	053325
Hao Zhu, Chao-Fei Liu, Deng-Shan Wang, Shou-Gen Yin, Lin Zhuang, and Wu-Ming Liu	
Strongly interacting two-component coupled Bose gas in optical lattices (<i>17 pages</i>)	053326
Sagarika Basak and Han Pu	
Discrete time crystals in Bose-Einstein condensates and the symmetry-breaking edge in a simple two-mode theory (<i>17 pages</i>)	053327
Jia Wang, Krzysztof Sacha, Peter Hannaford, and Bryan J. Dalton	
Three-body crossover from a Cooper triple to a bound trimer state in three-component Fermi gases near a triatomic resonance (<i>9 pages</i>)	053328
Hiroyuki Tajima, Shoichiro Tsutsui, Takahiro M. Doi, and Kei Iida	
Photonics, nonlinear optics, and optomechanics	
Bayesian inference for plasmonic nanometrology (<i>11 pages</i>)	053501
Joseph M. Lukens and Ali Passian	
Maxwell fish eye for polarized light (<i>6 pages</i>)	053502
Mher Davtyan, Zhyrair Gevorgian, and Armen Nersessian	
Theoretical solution of second-harmonic generation in periodically poled lithium niobate and chirped periodically poled lithium niobate thin film via quasi-phase-matching (<i>9 pages</i>)	053503
Lingzhi Peng, Lihong Hong, and Zhiyuan Li	
Vortex mode decomposition of the topology-induced phase transitions in spin-orbit optics (<i>6 pages</i>)	053504
Xiaohui Ling (凌晓辉), Fuxin Guan, Zan Zhang, He-Xiu Xu, Shiyi Xiao, and Hailu Luo	

(Continued)

Ultracold systems and matter waves

Evolution of static and dynamical density correlations of one-dimensional soft-core bosons from the Tonks-Girardeau limit to a clustering fluid (<i>10 pages</i>)	053301
Martina Teruzzi, Christian Apostoli, Davide Pini, Davide Emilio Galli, and Gianluca Bertaina	
Symmetry classification of uniform states in spin-2 Bose-Einstein condensates and neutron $^3P_2$ superfluids (<i>12 pages</i>)	053302
Michikazu Kobayashi and Muneto Nitta	
Extended Bose-Hubbard models with Rydberg macrodimer dressing (<i>11 pages</i>)	053304
Mathieu Barbier, Simon Hollerith, and Walter Hofstetter	
One-dimensional spin-1/2 fermionic gases with two-body losses: Weak dissipation and spin conservation (<i>12 pages</i>)	053305
Lorenzo Rosso, Davide Rossini, Alberto Biella, and Leonardo Mazza	
Statistical properties of the momentum occupation numbers of the Tonks-Girardeau gas in a harmonic trap (<i>11 pages</i>)	053306
P. Devillard, A. Benzahi, P. Vignolo, and M. Albert	
Anderson localization of excitations in disordered Gross-Pitaevskii lattices (<i>10 pages</i>)	053307
Yagmur Kati, Mikhail V. Fistul, Alexander Yu. Cherny, and Sergej Flach	
Universality class and exact phase boundary in the superradiant phase transition (<i>9 pages</i>)	053308
Wei-Feng Zhuang, Bin Geng, Hong-Gang Luo, Guang-Can Guo, and Ming Gong	
Simulating cosmological supercooling with a cold atom system. II. Thermal damping and parametric instability (<i>9 pages</i>)	053309
Thomas P. Billam, Kate Brown, Andrew J. Groszek, and Ian G. Moss	
Unified model of matter-wave-packet evolution and application to spatial coherence of atom interferometers (<i>16 pages</i>)	053310
Y. Japha	
Complex collisions of ultracold molecules: A toy model (<i>14 pages</i>)	053311
Jia K. Yao, Cooper A. Johnson, Nirav P. Mehta, and Kaden R. A. Hazzard	
Optical lattice for a tripodlike atomic level structure (<i>12 pages</i>)	053312
Piotr Kubala, Jakub Zakrzewski, and Mateusz Łącki	
Dicke superradiance of a two-component Fermi gas coupled to a quantized light field (<i>9 pages</i>)	053313
Ming-Yue Yang, Hong-Hao Yin, Lin Wen, An-Chun Ji, and Qing Sun	
Dynamics of a trapped ion in a quantum gas: Effects of particle statistics (<i>24 pages</i>)	053314
Lorenzo Oghittu, Melf Johannsen, Antonio Negretti, and Rene Gerritsma	
Effect of Rashba spin-orbit and Rabi couplings on the excitation spectrum of binary Bose-Einstein condensates (<i>14 pages</i>)	053315
Rajamanickam Ravisankar, Henrique Fabrelli, Arnaldo Gammal, Paulsamy Muruganandam, and Pankaj Kumar Mishra	
Approximate theories for binary magnetic quantum droplets (<i>9 pages</i>)	053316
Joseph C. Smith, P. B. Blakie, and D. Baillie	

(Continued)

Magnetic dichroism in few-photon ionization of polarized atoms (7 pages)	053103
B. P. Acharya, M. Dodson, S. Dubey, K. L. Romans, A. H. N. C. De Silva, K. Foster, O. Russ, K. Bartschat, N. Douguet, and D. Fischer	
Determining the stereo configuration of carbonyl sulfide dimers using Coulomb-explosion imaging (9 pages)	053104
Xitao Yu, Xinning Zhao, Zhenzhen Wang, Yizhang Yang, Xinyu Zhang, Pan Ma, Xiaokai Li, Chengye Wang, Xinpeng Xu, Chuncheng Wang, Dongdong Zhang, Sizuo Luo, and Dajun Ding	
Generation of fractional and multiple imaginary rotational alignment echoes (6 pages)	053105
Zhenzhong Lian, Zhan Hu, Hongxia Qi, Dehou Fei, Sizuo Luo, Zhou Chen, and Chuan-Cun Shu	
Multiphoton resonance in a driven Kerr oscillator in the presence of high-order nonlinearities (9 pages)	053106
Evgeny V. Anikin, Natalya S. Maslova, Nikolay A. Gippius, and Igor M. Sokolov	
Multiple photodetachment of silicon anions via <i>K</i> -shell excitation and ionization (7 pages)	053107
A. Perry-Sassmannshausen, T. Buhr, M. Martins, S. Reinwardt, F. Trinter, A. Müller, S. Fritzsche, and S. Schippers	
 Using graphene conductors to enhance the functionality of atom chips (20 pages)	053108
K. Wongcharoenbhorn, R. Crawford, N. Welch, F. Wang, G. Sinuco-León, P. Krüger, F. Intravaia, C. Koller, and T. M. Fromhold	
Using optical clock transitions in Cu II and Yb III for timekeeping and search for new physics (9 pages)	053109
Saleh O. Allehabi, V. A. Dzuba, and V. V. Flambaum	
Single-atom transport in optical conveyor belts: Enhanced shortcuts-to-adiabaticity approach (17 pages)	053110
Sascha H. Hauck, Gernot Alber, and Vladimir M. Stojanović	
Revealing rescattering-induced subcycle dynamics of the spiral-like holographic structure (8 pages)	053111
Peng Qin, Xufei Sun, Yunquan Liu, and Zhanghai Chen	
 Importance of one- and two-photon transitions in the strong-field dissociation of NO ²⁺ (9 pages)	053112
Bethany Jochim, M. Zohrabi, B. Gaire, Tereza Uhlířková, K. D. Carnes, E. Wells, B. D. Esry, and I. Ben-Itzhak	
Visualizing coherent molecular rotation in a gaseous medium (12 pages)	053113
Ilya Tutunnikov, Emilien Prost, Uri Steinitz, Pierre Béjot, Edouard Hertz, Franck Billard, Olivier Faucher, and Ilya Sh. Averbukh	
Generation of a single-ion large oscillator (6 pages)	053114
Ryoichi Saito and Takashi Mukaiyama	
Imaging charge migration in chiral molecules using time-resolved x-ray diffraction (8 pages)	053115
Sucharita Giri, Jean Christophe Tremblay, and Gopal Dixit	
Torus-knot angular momentum in twisted attosecond pulses from high-order harmonic generation (12 pages)	053116
Björn Minneker, Birger Böning, Anne Weber, and Stephan Fritzsche	
Stimulated slowing of Yb atoms on the narrow ¹ S ₀ → ³ P ₁ transition (11 pages)	053117
Tanaporn Na Narong, TianMin Liu, Nikhil Raghuram, and Leo Hollberg	
Robust control of quantum dynamics under input and parameter uncertainty (18 pages)	053118
Andrew Koswara, Vaibhav Bhutoria, and Raj Chakrabarti	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Reexamination of the ground-state Born-Oppenheimer Yb_2 potential (7 pages)	052807
Giorgio Visentin, Alexei A. Buchachenko, and Paweł Tecmer	
Resonant elastic scattering of polarized electrons on H-like ions (18 pages)	052808
D. M. Vasileva, K. N. Lyashchenko, A. B. Voitkiv, D. Yu. Andreev	
Unity of Kohn-Sham density-functional theory and reduced-density-matrix-functional theory (9 pages)	052809
Neil Qiang Su (苏乃强)	
<i>Ab initio</i> calculations of the spectrum of lawrencium (11 pages)	052810
E. V. Kahl, S. Raeder, E. Eliav, A. Borschevsky, and J. C. Berengut	
Theoretical study of the electronic structure of hafnium (Hf, $Z = 72$) and rutherfordium (Rf, $Z = 104$) atoms and their ions: Energy levels and hyperfine-structure constants (10 pages)	052811
Saleh O. Allehabi, V. A. Dzuba, and V. V. Flambaum	
Relativistic-coupled-cluster-theory analysis of properties of Co-like ions (13 pages)	052812
Dillip K. Nandy and B. K. Sahoo	
Measurement of the tune-out wavelength for ^{133}Cs at 880 nm (9 pages)	052813
Apichayaporn Ratkata, Philip D. Gregory, Andrew D. Innes, Jonas A. Matthies, Lewis A. McArd, Jonathan M. Mortlock, M. S. Safronova, Sarah L. Bromley, and Simon L. Cornish	
Two-atom van der Waals forces with one atom excited: The identical-atom limit (11 pages)	052814
J. Sánchez-Cánovas and M. Donaire	
Proton-helium collisions at intermediate energies: Singly differential ionization cross sections (12 pages)	052815
K. H. Spicer, C. T. Plowman, I. B. Abdurakhmanov, Sh. U. Alladustov, I. Bray, and A. S. Kadyrov	
Nuclear spin conversion in H_2O revisited (7 pages)	052816
P. L. Chapovsky and A. A. Mamrashev	
Model for nuclear spin product-state distributions of ultracold chemical reactions in magnetic fields (18 pages)	052817
Goulven Quémener, Ming-Guang Hu, Yu Liu, Matthew A. Nichols, Lingbang Zhu, and Kang-Kuen Ni	
Semirelativistic (e , $2e$) study with a twisted electron beam on Cu and Ag (12 pages)	052818
Aditi Mandal, Nikita Dhankhar, Didier Sébilleau, and Rakesh Choubisa	

PART B

Light-induced processes in atomic-scale systems

Two-level systems with periodic N -step driving fields: Exact dynamics and quantum state manipulations (18 pages)	053101
Zhi-Cheng Shi, Ye-Hong Chen, Wei Qin, Yan Xia, X. X. Yi, Shi-Biao Zheng, and Franco Nori	
Time-dependent post-collision-interaction effects in THz-field-assisted Auger decay (8 pages)	053102
I. J. Bermúdez Macias, I. P. Sazhina, R. Ivanov, S. Düsterer, and N. M. Kabachnik	

(Continued)

CONTENTS - Continued

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Optimal circular dichroism sensing with quantum light: Multiparameter estimation approach (14 pages)	052615
Christina Ioannou, Ranjith Nair, Ivan Fernandez-Corbaton, Mile Gu, Carsten Rockstuhl, and Changhyoup Lee	
Locally suppressed transverse-field protocol for diabatic quantum annealing (16 pages)	052616
Louis Fry-Bouriaux, Daniel T. O'Connor, Natasha Feinstein, and Paul A. Warburton	
Capturing non-Markovian dynamics with the reaction coordinate method (13 pages)	052617
Nicholas Anto-Sztrikacs and Dvira Segal	
Proposal for practical multidimensional quantum networks (10 pages)	052618
Davide Bacco, Jacob F. F. Bulmer, Manuel Erhard, Marcus Huber, and Stefano Paesani	
Invariant subspaces of two-qubit quantum gates and their application in the verification of quantum computers (8 pages)	052619
Jacob Chevalier Drori, Yordan S. Yordanov, Thierry Ferrus, Matthew Applegate, and Crispin H. W. Barnes	
Time scaling and quantum speed limit in non-Hermitian Hamiltonians (10 pages)	052620
F. Impens, F. M. D'Angelis, F. A. Pinheiro, and D. Guéry-Odelin	
Quantum estimation of a time-dependent perturbation (8 pages)	052621
Claus Normann Madsen, Lia Valdetaro, and Klaus Mølmer	
Braess paradox in a quantum network (7 pages)	052622
Abhishek Banerjee and Pratapaditya Bej	
Error-correcting entanglement swapping using a practical logical photon encoding (12 pages)	052623
Paul Hilaire, Edwin Barnes, Sophia E. Economou, and Frédéric Grosshans	
Designing gate operations for single-ion quantum computing in rare-earth-ion-doped crystals (13 pages)	052624
Adam Kinos, Lars Rippe, Stefan Kröll, and Andreas Walther	
Quantum gates robust to secular amplitude drifts (12 pages)	052625
Qile David Su, Robijn Bruinsma, and Wesley C. Campbell	
Atomic and molecular structure and dynamics; high-precision experiments	
Pair production seeded by electrons in noble gases as a method for laser intensity diagnostics (12 pages)	052801
I. A. Aleksandrov and A. A. Andreev	
Theoretical approaches for hard electron bremsstrahlung and their scaling properties in the ultrarelativistic regime (9 pages)	052802
D. H. Jakubassa-Amundsen	
Rare decays of the positronium ion and molecule, $\text{Ps}^- \rightarrow e^- \gamma$ and $\text{Ps}_2 \rightarrow e^+ e^- \gamma, \gamma \gamma, e^+ e^-$ (7 pages)	052803
M. Jamil Aslam, Wen Chen, Andrzej Czarnecki, Samiur Rahman Mir, and Muhammad Mubasher	
Precision measurement of the $^{43}\text{Ca}^+$ nuclear magnetic moment (9 pages)	052804
R. K. Hanley, D. T. C. Allcock, T. P. Harty, M. A. Sepiol, and D. M. Lucas	
Trichromatic shaper-based quantum state holography (14 pages)	052805
K. Eickhoff, L. Feld, D. Köhnke, T. Bayer, and M. Wollenhaupt	
Second-order perturbative correlation energy functional in the ensemble density-functional theory (10 pages)	052806
Zeng-hui Yang	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Multiparty orthogonal product states with minimal genuine nonlocality (<i>8 pages</i>)	052433
Sumit Rout, Ananda G. Maity, Amit Mukherjee, Saronath Halder, and Manik Banik	
Anisotropy-exchange resonance as a mechanism for entangled state switching (<i>6 pages</i>)	052434
Eric D. Switzer, Xiao-Guang Zhang, and Talat S. Rahman	
Quantum technologies	
Quantum coherent microwave-optical transduction using high-overtone bulk acoustic resonances (<i>20 pages</i>)	052601
Terence Blésin, Hao Tian, Sunil A. Bhave, and Tobias J. Kippenberg	
Phase-state duality in reversible circuit design (<i>13 pages</i>)	052602
Matthew Amy and Neil J. Ross	
Success of digital adiabatic simulation with large Trotter step (<i>10 pages</i>)	052603
Changhao Yi	
Fidelity of time-bin-entangled multiphoton states from a quantum emitter (<i>21 pages</i>)	052604
Konstantin Tiurev, Pol Llopart Mirambell, Mikkel Bloch Lauritzen, Martin Hayhurst Appel, Alexey Tiranov, Peter Lodahl, and Anders Søndberg Sørensen	
Non-Gaussian operations in measurement-device-independent quantum key distribution (<i>11 pages</i>)	052605
Jaskaran Singh and Soumyakanti Bose	
Quantum hashing via single-photon states with orbital angular momentum (<i>8 pages</i>)	052606
D. A. Turaykhanov, D. O. Akat'ev, A. V. Vasiliev, F. M. Ablayev, and A. A. Kalachev	
Extending quantum probabilistic error cancellation by noise scaling (<i>12 pages</i>)	052607
Andrea Mari, Nathan Shammah, and William J. Zeng	
Dissipation-enabled resonant adiabatic quantum state transfer: Entanglement generation and quantum cloning (<i>15 pages</i>)	052608
Marvin Gajewski, Thorsten Haase, and Gernot Alber	
Digital quantum simulation of beam splitters and squeezing with IBM quantum computers (<i>12 pages</i>)	052609
Paula Cordero Encinar, Andrés Agustí, and Carlos Sabín	
Measurement of electric-field noise from interchangeable samples with a trapped-ion sensor (<i>10 pages</i>)	052610
Kyle S. McKay, Dustin A. Hite, Philip D. Kent, Shlomi Kotler, Dietrich Leibfried, Daniel H. Slichter, Andrew C. Wilson, and David P. Pappas	
 Dephasing superchannels (<i>12 pages</i>)	052611
Zbigniew Puchała, Kamil Korzekwa, Roberto Salazar, Paweł Horodecki, and Karol Życzkowski	
Subexponential rate versus distance with time-multiplexed quantum repeaters (<i>13 pages</i>)	052612
Prajit Dhara, Ashlesha Patil, Hari Krovi, and Saikat Guha	
Security of quantum communications in oceanic turbulence (<i>16 pages</i>)	052613
Zhiyue Zuo, Yijun Wang, Yiyu Mao, Xinchao Ruan, and Ying Guo	
Robust control of quantum systems by quantum systems (<i>10 pages</i>)	052614
Thomas Konrad, Amy Rouillard, Michael Kastner, and Hermann Uys	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Towards practical anonymous quantum communication: A measurement-device-independent approach (<i>11 pages</i>)	052415
Yu-Guang Yang, Xiao-Xiao Liu, Shang Gao, Yi-Hua Zhou, Wei-Min Shi, Jian Li, and Dan Li	
Qudits for witnessing quantum-gravity-induced entanglement of masses under decoherence (<i>13 pages</i>)	052416
Jules Tilly, Ryan J. Marshman, Anupam Mazumdar, and Sougato Bose	
Generalized quantum circuit differentiation rules (<i>12 pages</i>)	052417
Oleksandr Kyriienko and Vincent E. Elfving	
Shadow tomography based on informationally complete positive operator-valued measure (<i>11 pages</i>)	052418
Atithi Acharya, Siddhartha Saha, and Anirvan M. Sengupta	
Fixed-angle conjectures for the quantum approximate optimization algorithm on regular MaxCut graphs (<i>9 pages</i>)	052419
Jonathan Wurtz and Danylo Lykov	
Quantum algorithms for open lattice field theory (<i>15 pages</i>)	052420
Jay Hubisz, Bharath Sambasivam, and Judah Unmuth-Yockey	
Quantum state transfer between distant optomechanical interfaces via shortcut to adiabaticity (<i>6 pages</i>)	052421
Hanzhe Xi and Pei Pei	
Upper bounds on the leakage of private data and an operational approach to Markovianity (<i>17 pages</i>)	052422
Karol Horodecki, Michał Studziński, Ryszard P. Kostecki, Omer Sakarya, and Dong Yang	
Multipartite quantum correlations in a two-mode Dicke model (<i>11 pages</i>)	052423
Rodolfo R. Soldati, Mark T. Mitchison, and Gabriel T. Landi	
Control cost and quantum speed limit time in controlled almost-exact state transmission in open systems (<i>8 pages</i>)	052424
Shen-Shuang Nie, Feng-Hua Ren, Run-Hong He, Jing Wu, and Zhao-Ming Wang	
Experimental certification of the steering criterion based on the local uncertainty relation (<i>6 pages</i>)	052425
Fa Zhao, Huan Yang, Xue-Ke Song, Dong Wang, and Liu Ye	
Quantum-memory-enhanced dissipative entanglement creation in nonequilibrium steady states (<i>11 pages</i>)	052426
Daniel Heineken, Konstantin Beyer, Kimmo Luoma, and Walter T. Strunz	
Einstein-Podolsky-Rosen steering based on semisupervised machine learning (<i>8 pages</i>)	052427
Lifeng Zhang, Zhihua Chen, and Shao-Ming Fei	
Quantum data hiding with continuous-variable systems (<i>23 pages</i>)	052428
Ludovico Lami	
Identifying genuine quantum teleportation (<i>14 pages</i>)	052429
Chia-Kuo Chen, Shih-Hsuan Chen, Ni-Ni Huang, and Che-Ming Li	
Multipartite spatial entanglement generated by concurrent nonlinear processes (<i>17 pages</i>)	052430
Alessandra Gatti	
Hamiltonian tomography by the quantum quench protocol with random noise (<i>8 pages</i>)	052431
Artur Czerwinski	
Bhatia-Davis formula in the quantum speed limit (<i>16 pages</i>)	052432
Jing Liu, Zibo Miao, Libin Fu, and Xiaoguang Wang	

(Continued)

Conservation of correlation in measurements underlying the violation of Bell inequalities and a game of joint mapping (<i>7 pages</i>)	052226
Agung Budiyo	
Quantifying unsharpness of measurements via uncertainty (<i>10 pages</i>)	052227
Yizhou Liu and Shunlong Luo	
Quantum information science	
Different types of coherence: Young-type interference versus Dicke superradiance (<i>9 pages</i>)	052401
D. Bhatti, M. Bojer, and J. von Zanthier	
Variational quantum algorithm for molecular geometry optimization (<i>7 pages</i>)	052402
Alain Delgado, Juan Miguel Arrazola, Soran Jahangiri, Zeyue Niu, Josh Izaac, Chase Roberts, and Nathan Killoran	
Nonclassical kernels in continuous-variable systems (<i>5 pages</i>)	052403
Roohollah Ghobadi	
Quantum advantage and noise reduction in distributed quantum computing (<i>9 pages</i>)	052404
J. Avron, Ofer Casper, and Ilan Rozen	
Effective protection of quantum coherence by a non-Hermitian driving potential (<i>9 pages</i>)	052405
Kai-Qian Huang, Wen-Lei Zhao, and Zhi Li	
☞ Evaluating the advantage of adaptive strategies for quantum channel distinguishability (<i>15 pages</i>)	052406
Vishal Katariya and Mark M. Wilde	
Cumulative generation of maximal entanglement between spectrally distinct qubits using squeezed light (<i>11 pages</i>)	052407
Elena Callus and Pieter Kok	
☞ Entropy production and the role of correlations in quantum Brownian motion (<i>13 pages</i>)	052408
Alessandra Colla and Heinz-Peter Breuer	
Variational quantum algorithm based on the minimum potential energy for solving the Poisson equation (<i>15 pages</i>)	052409
Yuki Sato, Ruho Kondo, Satoshi Koide, Hideki Takamatsu, and Nobuyuki Imoto	
Quantum diffusion map for nonlinear dimensionality reduction (<i>12 pages</i>)	052410
Apimuk Sornsaeng, Ninnat Dangniam, Pantita Palittapongarnpim, and Thiparat Chotibut	
Quantum limit to subdiffraction incoherent optical imaging. II. A parametric-submodel approach (<i>16 pages</i>)	052411
Mankei Tsang	
Multiclass classification of dephasing channels (<i>8 pages</i>)	052412
Adriano M. Palmieri, Federico Bianchi, Matteo G. A. Paris, and Claudia Benedetti	
Preparation of many-body ground states by time evolution with variational microscopic magnetic fields and incomplete interactions (<i>8 pages</i>)	052413
Ying Lu, Yue-Min Li, Peng-Fei Zhou, and Shi-Ju Ran	
Tighter sum uncertainty relations based on metric-adjusted skew information (<i>8 pages</i>)	052414
Ruonan Ren, Ping Li, Mingfei Ye, and Yongming Li	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 104, NUMBER 5

NOVEMBER 2021

Quantum Bell nonlocality as a form of entanglement (<i>14 pages</i>)	052208
Eric Chitambar, Gilad Gour, Kuntal Sengupta, and Rana Zibakhsh	
General Wick's theorem for bosonic and fermionic operators (<i>6 pages</i>)	052209
L. Ferialdi and L. Diósi	
Achieving fast high-fidelity optimal control of many-body quantum dynamics (<i>17 pages</i>)	052210
Jesper Hasseriis Mohr Jensen, Frederik Skovbo Møller, Jens Jakob Sørensen, and Jacob Friis Sherson	
Photon quantum mechanics in real Hilbert space (<i>6 pages</i>)	052211
Margaret Hawton	
Nonlocal boxes for networks (<i>6 pages</i>)	052212
Jean-Daniel Bancal and Nicolas Gisin	
Intrinsic quantum correlations for Gaussian localized Dirac cat states in phase space (<i>17 pages</i>)	052213
Caio Fernando e Silva and Alex E. Bernardini	
Uninformed Bayesian quantum thermometry (<i>11 pages</i>)	052214
Julia Boeyens, Stella Seah, and Stefan Nimmrichter	
Adapted projection operator technique for the treatment of initial correlations (<i>18 pages</i>)	052215
Andrea Trevisan, Andrea Smirne, Nina Megier, and Bassano Vacchini	
Relating measurement disturbance, information, and orthogonality (<i>8 pages</i>)	052216
Yizhou Liu and John B. DeBroya	
Exactly solvable model for anyons with non-Abelian flux (<i>6 pages</i>)	052217
Bruno Klajn, Silvije Domazet, Dario Jukić, and Hrvoje Buljan	
Exact result for the polaron mass in a one-dimensional Bose gas (<i>5 pages</i>)	052218
Zoran Ristivojevic	
Coarse-graining master equation for periodically driven systems (<i>13 pages</i>)	052219
Ronja Hotz and Gernot Schaller	
Quantum transient heat transport in the hyperparametric oscillator (<i>11 pages</i>)	052220
JungYun Han, Daniel Leykam, Dimitris G. Angelakis, and Juzar Thingna	
Effect of spontaneous emission on the shortcut to adiabaticity in three-state systems (<i>6 pages</i>)	052221
X. Shi and H. Q. Zhao	
Detection of an unbroken phase of a non-Hermitian system via a Hermitian factorization surface (<i>8 pages</i>)	052222
Leela Ganesh Chandra Lakkaraju and Aditi Sen(De)	
Relative purity, speed of fluctuations, and bounds on equilibration times (<i>13 pages</i>)	052223
Diego Paiva Pires and Thiago R. de Oliveira	
☞ Inconsistency of linear dynamics and Born's rule (<i>11 pages</i>)	052224
Lotte Mertens, Matthijs Wesseling, Niels Vercauteren, Alonso Corrales-Salazar, and Jasper van Wezel	
Leggett-Garg inequalities and decays of unstable systems (<i>7 pages</i>)	052225
Francesco Giacosa and Giuseppe Pagliara	

(Continued)

Light-induced processes in atomic-scale systems

- Probing tunneling dynamics of dissociative H_2 molecules using two-color bicircularly polarized fields (*6 pages*) L051101
 Zhenning Guo, Yiqi Fang, Peipei Ge, Xiaoyang Yu, Jiguo Wang, Meng Han, Qihuang Gong, and Yunquan Liu

Photonics, nonlinear optics, and optomechanics

- Immutable quantized transport in Floquet chains (*6 pages*) L051501
 Bastian Höckendorf, Andreas Alvermann, and Holger Fehske
- Superexponential amplification, power blowup, and solitons sustained by non-Hermitian gauge potentials (*6 pages*) L051502
 Dmitry A. Zezyulin, Yaroslav V. Kartashov, and Vladimir V. Konotop
- Surface plasmonic Cherenkov radiation and symmetry breaking within a coherent nonlinear nanostructure (*5 pages*) L051503
 Saeid Asgarneshad-Zorgabad

Quantum optics

-  Remote state preparation of single-photon orbital-angular-momentum lattices (*5 pages*) L051701
 Andrew R. Cameron, Sandra W. L. Cheng, Sacha Schwarz, Connor Kapahi, Dusan Sarenac, Michael Grabowecky, David G. Cory, Thomas Jennewein, Dmitry A. Pushin, and Kevin J. Resch

ARTICLES**Fundamental concepts**

- Enhanced quantumness via non-Markovianity (*12 pages*) 052201
 Haiping Li, Jian Zou, and Bin Shao
- Multipartite quantum nonlocality and Bell-type inequalities in a spin-1/2 model with topological quantum phase transitions (*10 pages*) 052202
 Zhao-Yu Sun, Hui-Xin Wen, Meng Li, and Yuebin Li
- Exploiting Gaussian steering to probe non-Markovianity due to the interaction with a structured environment (*9 pages*) 052203
 Massimo Frigerio, Samaneh Hesabi, Davood Afshar, and Matteo G. A. Paris
- Unveiling non-Markovian spacetime signaling in open quantum systems with long-range tensor network dynamics (*14 pages*) 052204
 Thibaut Lacroix, Angus Dunnett, Dominic Gribben, Brendon W. Lovett, and Alex Chin
- Transition to the classical regime in quantum mechanics on a lattice and implications of discontinuous space (*11 pages*) 052206
 Oleg Kabernik
- Any physical theory of nature must be boundlessly multipartite nonlocal (*15 pages*) 052207
 Xavier Coiteux-Roy, Elie Wolfe, and Marc-Olivier Renou

(Continued)

PHYSICAL REVIEW ATM

For editorial and subscription correspondence,
please see inside front cover
(ISSN: 2469-9926)

PERIODICALS
Postmaster send address changes to:
APS Subscription Services
P.O. Box 41
Annapolis Junction, MD 20701

THIRD SERIES, VOLUME 104, NUMBER 5
PARTS A AND B

CONTENTS

NOVEMBER 2021

*The Table of Contents is a total listing of Parts A and B.
Part A consists of pages L050201–052818, and Part B pages 053101–059904(E).*

PART A

LETTERS

Fundamental concepts

- Genuine activation of nonlocality: From locally available to locally hidden information (6 pages) L050201
Somshubhro Bandyopadhyay and Saronath Halder
- Almost complete revivals in quantum many-body systems (5 pages) L050202
Igor Ermakov and Boris V. Fine
- End-point measurement approach to assess quantum coherence in energy fluctuations (5 pages) L050203
S. Gherardini, A. Belenchia, M. Paternostro, and A. Trombettoni
- Time-energy uncertainty relation for quantum events (5 pages) L050204
Matteo Fadel and Lorenzo Maccone

Quantum information science

- Iterative quantum-assisted eigensolver (6 pages) L050401
Kishor Bharti and Tobias Haug
- All entangled states are quantum coherent with locally distinguishable bases (4 pages) L050402
Asmitha Mekala and Ujjwal Sen
- Digitized adiabatic quantum factorization (6 pages) L050403
Narendra N. Hegade, Koushik Paul, F. Albarrán-Arriagada, Xi Chen, and Enrique Solano
- Quantum non-Markovianity elusive to interventions (6 pages) L050404
Daniel Burgarth, Paolo Facchi, Davide Lonigro, and Kavan Modi
- Near-unit efficiency of chiral state conversion via hybrid-Liouillian dynamics (6 pages) L050405
Parveen Kumar, Kyrylo Snizhko, and Yuval Gefen

Atomic and molecular structure and dynamics; high-precision experiments

- Observation of orthopositronium thermalization in silica aerogel at cryogenic temperatures (6 pages) L050801
Kenji Shu, Akira Ishida, Toshio Namba, Shoji Asai, Nagayasu Oshima, Brian E. O'Rourke, and Kenji Ito



Copyright 2021 by American Physical Society



2469-9926(202111)104:5:B;1-Z

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).